

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions and listings of claims in the application:

Claims 1-97 (Canceled).

98. (Currently Amended) A machine for abrading ~~or polishing~~ a workpiece, the machine comprising:

a holding surface for holding said workpiece;

a head member arranged along a rotation axis to rotate about the rotation axis;

a working member having a surface for abrading ~~or polishing~~ said workpiece arranged on said head member on said rotation axis for rotation about said rotation axis with said head member;

first driving means for driving said head member and said working member mounted thereon to rotate about said rotation axis;

head mounting means for mounting said head member;

second driving means for driving said head mounting means to incline said rotation axis of said head member relative to a precession axis intersecting said rotation axis, and for moving said head member to inclined positions with said rotation axis precessed about said precession axis; and

third driving means for relatively moving said head mounting means across said holding surface.

99. (Previously Presented) A machine according to claim 98 wherein said first driving means is arranged to drive surface of said working member in a lateral direction relative to said holding surface, and said second driving means is adapted to rotate said surface of said working member relative to a position on said holding surface so that a direction of lateral relative movement of said surface of said working member and said holding surface rotate relative to said position on said holding surface.

100. (Currently Amended) A machine according to claim 98, wherein said second driving means is arranged to move said head member to inclined positions distributed through an integer number of ~~[[360E]]~~ 3600 of precession of said rotation axis about said precession axis.

101. (Previously Presented) A machine according to claim 98, wherein said second driving means is arranged to move said head member in precession steps.

102. (Currently Amended) A machine according to claim 101, wherein said second driving means is arranged to move said head member in precession steps which are symmetrically distributed about the precession axis through an integer number of ~~[[360E]]~~ 3600 of angle of precession about the precession axis.

103. (Previously Presented) A machine according to claim 98, wherein second driving means is arranged to incrementally carry out the precession at precession steps which are not integer division of 360 degrees.

104. (Previously Presented) A machine according to claim 98, wherein said head mounting means is arranged such that said precession axis intersects said rotation axis at or near said abrasive member.

105. (Previously Presented) A machine according to claim 98, including control means for controlling said first and second driving means such that the rate of movement of said head member about said rotation axis is substantially smaller than the rate of rotation of said head member.

106. (Previously Presented) A machine according to claim 98, wherein said head mounting means includes first and second arcuate members arranged orthogonally, each with a center of curvature arranged to lie on an axis passing through or near said working member, said head member being mounted at a second end thereof to said first and second arcuate members by said second driving means to move said second end of said head member in a respective orthogonal arc about a respective axis of the arcuate members.

107. (Previously Presented) A machine according to claim 98, wherein said third driving means is arranged to also relatively move said head member to and away from said holding surface.

108. (Previously Presented) A machine according to claim 98, wherein said holding surface is arranged to be relatively rotated with respect to said head mounting means.

109. (Previously Presented) A machine according to claim 98, wherein said working member is bulbous.

110. (Previously Presented) A machine according to claim 109, wherein said working member is compliant.

111. (Previously Presented) A machine according to claim 98, including control means operative to receive information on the topography of said workpiece and to

control said second driving means to precess said head member about said precession axis normal to the surface of said workpiece at a position being abraded or polished.

112. (Previously Presented) A machine according to claim 111, wherein said control means is operative to receive information on the roughness of said workpiece and a rate of removal for material removed from said workpiece by said working member, to control said third driving means to move said head mounting means in a repeated figuring pattern and to control said first, second and third driving means to remove less than four times a local roughness average for a region of the workpiece being polished or abraded during each configuring pattern.

113. (Previously Presented) A machine according to claim 112, wherein said control means is adapted to control said second driving means to use varied inclined positions about said precession axis for each figuring pattern.

Claims 114-128 (Canceled).

129. (Currently Amended) A machine for abrading ~~and/or polishing~~ a workpiece, the machine comprising:

a holding surface for holding said workpiece;

a head carrying a face for abrading ~~and/or polishing~~ said workpiece;

a ~~mechanical~~ mounting arrangement for supporting and moving said head across, to and from said holding surface;

a tilting mechanism mounted on said ~~mechanical~~ mounting arrangement and arranged to tilt said head about a pivot to an angle relative to said holding surface;
and

control means for controlling the position and tilt of said face of said head by controlling said ~~mechanical~~ mounting arrangement and said tilting mechanism, said control means being operative to compensate for movement of said face when tilted by controlling said ~~mechanical~~ mounting arrangement.

130. (Previously Presented) A machine according to claim 129, wherein said control means is operative to perform the compensating control by calculating the change in position of said face caused by the tilt.

131. (Previously Presented) A machine according to claim 129, wherein said control means is operative to perform the compensating control by looking-up the change in position of said face caused by the tilt.

Claims 132-134 (Canceled).

135. (Previously Amended) A carrier medium storing instructions for controlling a processor to control a machine according to any one of claims 98 to 113 or 129 to 131.

167. (Currently Amended) A machine for abrading ~~or polishing~~ a workpiece, the machine comprising:

a ~~body~~ housing extending along a rotation axis and having a housing fluid pressure transmission ~~means~~ membrane at one end of said ~~body~~ housing, said ~~body~~ housing being rotatable about said rotation axis;

a head releasably mounted on said end of said ~~body~~ housing, said head comprising a head housing, a head fluid pressure transmission ~~means~~ membrane, and a resilient membrane forming a sealed head fluid chamber filled with fluid, said head fluid pressure transmission ~~means~~ membrane being arranged in said head housing to cooperate with said housing fluid pressure transmission ~~means~~ membrane to transmit

pressure to said head fluid chamber, and said resilient membrane being held at a periphery thereof by said head housing to extend bulbously therefrom for the application of pressure to said workpiece during abrading ~~or polishing~~.

168. (Currently Amended) A machine according to claim 167, wherein said ~~body~~ housing has a ~~body~~ housing fluid chamber filled with fluid terminating at said housing fluid pressure transmission ~~means~~ membrane.

169. (Currently Amended) A machine according to claim 168, wherein said ~~body~~ housing fluid pressure transmission ~~means~~ membrane and said head fluid pressure transmission ~~means~~ membrane ~~comprise~~ are respective displacement devices mounted respectively in said ~~body~~ housing and said head, and are coupled to one another when said head is mounted to said body.

170. (Previously Presented) A machine according to claim 168, wherein said body fluid chamber and said head fluid chamber are filled with incompressible fluid.

171. (Previously Presented) A machine according to claim 168, including fluid pressure control means comprising a passage from said body fluid chamber, to a fluid pressure control arrangement provided separate to said rotatable body.

172. (Previously Presented) A machine according to claim 167, wherein said head is axially mountable to said body.

173. (Currently Amended) A tool head for releasably mounting on a ~~tool-body~~ housing of a machine for abrading ~~or polishing~~ a workpiece, the ~~tool-body~~ housing having a housing fluid pressure transmission ~~means~~ membrane, the tool head comprising:

a head housing, a head fluid pressure transmission ~~means~~ membrane and a resilient membrane forming a sealed head fluid chamber for holding fluid, said head fluid pressure transmission ~~means~~ membrane being arranged in said head housing to allow the coupling of fluid pressure in said head fluid chamber ~~[[to]]~~ from said housing fluid pressure transmission ~~means~~ membrane, and said resilient membrane being held at a periphery thereof by said head housing to extend bulbously therefrom for the application of pressure to said workpiece during abrading ~~or polishing~~.

174. (Currently Amended) A tool head according to claim 173, wherein said head fluid pressure transmission ~~means~~ membrane ~~comprises~~ is a first displacement device ~~for coupling that is coupled~~ with said housing fluid pressure transmission ~~means~~ comprising membrane, wherein said housing fluid pressure transmission membrane is a second displacement device when said tool head is mounted on said ~~tool body~~ housing.

175. (Previously Presented) A tool head according to claim 173, wherein said head fluid chamber is filled with incompressible fluid.

Claims 176-194 (Canceled).